CLAIMS

1) A Vertical External Cavity Surface Emitting Laser comprising: a semiconductor wafer structure, containing a gain medium and a Bragg reflecting region; and a heatspreader associated with the wafer structure such that the gain medium is located between the heatspreader and the Bragg reflecting region, wherein the heatspreader comprises a non-birefringent material.

2) A laser as claimed in Claim 1 wherein the heatspreader comprises a first surface upon which is located an anti-reflection coating.

3) A Vertical External Cavity Surface Emitting Laser comprising: a semiconductor wafer structure containing a gain medium and a Bragg reflecting region; and a heatspreader associated with the wafer structure such that the gain medium is located between the heatspreader and the Bragg reflecting region, wherein the heatspreader comprises a first surface upon which is located an anti-reflection coating.

4) A laser as claimed in Claim 3 wherein the heatspreader comprises a non-birefringent material.

5) A laser as claimed in any of Claims 2 to 4 wherein the anti-reflection coating is optimised for efficient operation with a refractive index of the non-birefringent material and a lasing frequency of the laser.

6) A laser as claimed in any of Claims 2 to 5 wherein the first surface of the heatspreader comprise a wedge.

7) A laser as claimed in any of the preceding claims wherein the heatspreader comprises a single diamond crystal.

8) A laser as claimed in any of the preceding claims wherein lasing is achieved by optical excitement of the gain medium.

9) A laser as claimed in any of claims 1 to 7 wherein lasing is achieved by electrical excitement of the gain medium.

10) A laser as claimed in any of the preceding claims wherein the laser further comprises an intracavity polarisation selecting element that provides a first means for selecting the operating frequency of the laser.

11) A laser as claimed in Claim 10 wherein the intracavity polarisation selecting element comprises a birefringent filter orientated at Brewster's angle.

12) A laser as claimed in any of the preceding claims wherein the laser further comprises an intracavity etalon that provides a second means for selecting the operating frequency of the laser.

13) A laser as claimed in any of the preceding claims wherein the laser further comprises an external reference cavity that allows for the frequency stabilisation of the laser output to a side of a transmission peak of the external cavity.

14) A laser as claimed in any of the preceding claims wherein the laser comprises a three mirror folded cavity arrangement.

15) A laser as claimed in Claim 14 wherein the laser further comprises a cavity mirror mounted on a first piezoelectric crystal and an output coupler mounted on a second piezoelectric crystal wherein the combined movement of the cavity mirror and the output coupler provides a first means for frequency tuning the output of the laser.

16) A laser as claimed in Claim 14 or 15 wherein the laser further comprises a pair of Brewster plates and a cavity mirror mounted on a piezoelectric crystal wherein the combined movement of the Brewster plates and the cavity mirror provide a second means for frequency tuning the output of the laser.

17) A frequency scanning Vertical External Cavity Surface Emitting Laser suitable for use in high resolution spectroscopy experiments comprising: apparatus for selecting and stabilising the operating frequency of the laser; apparatus for scanning the operating frequency of the laser; a semiconductor wafer structure containing a gain medium and a Bragg reflecting region; and a heatspreader associated with

the wafer structure such that the gain medium is located between the heatspreader and the Bragg reflecting region, wherein the heatspreader comprises a non-birefringent material.

18) A laser as claimed in Claim 17 wherein the heatspreader comprises a first surface upon which is located an anti-reflection coating.

19) A laser as claimed in Claim 17 or 18 wherein the apparatus for selecting and stabilising the operating frequency of the laser comprises an intracavity polarisation selecting element that provides a first means for selecting the operating frequency of the laser

20) A laser as claimed in Claim 19 wherein the apparatus for selecting and stabilising the operating frequency of the laser further comprises an intracavity etalon that provides a second means for selecting the operating frequency of the laser.

21) A laser as claimed in Claim 20 wherein the apparatus for selecting and stabilising the operating frequency of the laser further comprises an external reference cavity that allows for the frequency stabilisation of the laser output to a side of a transmission peak of the external cavity.

22) A laser as claimed in any of claims 17 to 21 wherein the apparatus for scanning the operating frequency of the laser comprises a cavity mirror mounted on a first piezoelectric crystal and an output coupler

mounted on a second piezoelectric crystal wherein the combined movement of the cavity mirror and the output coupler provides a first means for tuning the frequency output of the laser.

23) A laser as claimed in any of claims 17 to 22 wherein the apparatus for scanning the operating frequency of the laser comprises a pair of Brewster plates and a cavity mirror mounted on a piezoelectric crystal wherein the combined movement of the Brewster plates and the cavity mirror provides a second means for tuning the frequency output of the laser.

24) A laser as claimed in any of claims 18 to 23 wherein the anti-reflection coating is optimised for efficient operation with a refractive index of the non-birefringent material and a lasing frequency of the laser.

25) A laser as claimed in any of claims 17 to 24 wherein the first surface of the heatspreader comprise a wedge.

26) A laser as claimed in any of claims 17 to 25 wherein the heatspreader comprises a single diamond crystal.